

Notice of Allowability

Application No.

10/824,798

Examiner

Rudy Zervigon

Applicant(s)

SHINRIKI ET AL.

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant's After-Final submission of May 21, 2007.
2. ☒ The allowed claim(s) is/are 1-20 and 30-40.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on May 21, 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of 10/960,600 has been reviewed and is accepted. The terminal disclaimer has been recorded.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Katsuhiro Arai on June 7th & 10th, 2007.

The application has been amended as follows:

Claim 1 (currently amended): A gas-feeding apparatus ~~configured to be~~ connected to an evacuable reaction chamber provided with a support for placing a substrate thereon, a gas-distribution head for introducing gases into the chamber through a head surface, comprising: a first plate having exclusively a first flow channel for discharging a first gas therein through the first flow channel and the head surface toward the support; and a second plate constituting the head surface and an exhaust path and disposed under the first plate, said second plate having both the first flow channel and a second flow channel which is for discharging a second gas through the second flow channel and the head surface toward the support, wherein there is no gas-mixing between the first flow channel and the second flow channel, ~~at least one of which flow channels~~ said exhaust path is coupled to an exhaust system for purging therefrom a gas present in the corresponding flow channel without passing through the head surface, said first and second plates being stratified parallel to each other in a direction perpendicular to their axial direction and being overlapped as viewed in the axial direction, said second plate being closer to the head surface than is the first plate.

Art Unit: 1763

Claim 2 (Previously Presented): The gas-feeding apparatus according to Claim 1, wherein at least the first flow channel is coupled to the exhaust system for purging a gas present in the first flow channel without passing through the head surface.

Claim 3 (Previously Presented): The gas-feeding apparatus according to Claim 1, wherein the second flow channel is coupled to the exhaust system for purging a gas present in the second flow channel without passing through the head surface.

Claim 4 (Previously Presented): The gas-feeding apparatus according to Claim 1, wherein the first flow channel and the second flow channel are both respectively coupled to exhaust systems, for purging a gas present in the corresponding flow channel without passing through the head surface.

Claim 5 (Previously Presented): The gas-feeding apparatus according to Claim 2, wherein the first flow channel has a volume which is larger than that of the second flow channel.

Claim 6 (Previously Presented): The gas-feeding apparatus according to Claim 2, wherein the first flow channel and the second flow channel are overlapped as viewed in the axial direction.

Claim 7 (Previously Presented): The gas-feeding apparatus according to Claim 6, wherein the first flow channel and the second flow channel are gas-separately communicated with the head surface through a plurality of bores, respectively, wherein there is an overlapping area on the head surface where the first flow channel and the second flow channel are overlapped as viewed in the axial direction and both the bores of the first flow channel and the bores of the second flow channel are provided.

Claim 8 (Previously Presented): The gas-feeding apparatus according to Claim 2, wherein the first flow channel comprises a central distribution inlet and a cone-shaped distribution plate extending radially therefrom.

Claim 9 (Previously Presented): The gas-feeding apparatus according to Claim 4, wherein the first plate has bores communicating the first flow channel, and the second plate has bores communicating the first flow channel and bores communicating the second flow channel.

Claim 10 (Currently Amended): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the second flow channel and the head surface are disposed predominantly in a central area of the head surface, whereas the bores communicating the first ~~section~~ flow channel and the head surface are uniformly distributed on the head surface including the central area.

Claim 11 (Currently Amended): The gas-feeding apparatus according to Claim 10, wherein the second ~~section~~ flow channel has a prolonged shape in the gas-distribution head.

Art Unit: 1763

Claim 12 (Previously Presented): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the first flow channel and the head surface have a total opening area on the head surface which is larger than that of the bores communicating the second flow channel and the head surface.

Claim 13 (Previously Presented): The gas-feeding apparatus according to Claim 9, wherein the bores communicating the first flow channel and the head surface have an average bore size which is larger than that of the bores communicating the second flow channel and the head surface.

Claim 14 (Previously Presented): The gas-feeding apparatus according to Claim 2, further comprising an RF power source for exerting RF power exclusively onto an interior of the second flow channel.

Claim 15 (Previously Presented): The gas-feeding apparatus according to Claim 14, wherein the RF power source is coupled to the first plate which physically separates and insulates the first flow channel from the second flow channel, and the head surface is grounded.

Claim 16 (Previously Presented): The gas-feeding apparatus according to Claim 1, further comprising an RF power source coupled to the gas-distribution head to exert RF power onto an interior of the reaction chamber.

Claim 17 (Previously Presented): The gas-feeding apparatus according to Claim 2, wherein the first flow channel is coupled to a source gas line and a purge gas line, and the second flow channel is coupled to an additive gas line and a purge gas line.

Claim 18 (Previously Presented): The gas-feeding apparatus according to Claim 1, which is connected to an evacuable reaction chamber provided with a support for placing a substrate thereon.

Claim 19 (Previously Presented): The gas-feeding apparatus according to Claim 18, wherein a space between the head surface and the support is coupled to an exhaust system.

Claim 20 (Previously Presented): The gas-feeding apparatus according to Claim 19, wherein the exhaust system for purging therefrom a gas present in the first or second flow channels and the exhaust system for evacuating the space between the head surface and the support are connected and merged to a single exhaust line.

Claims 21-29 (Previously Cancelled)

Claim 30 (currently amended): A gas-feeding apparatus ~~adapted to be~~ connected to an evacuable reaction chamber for atomic layer growth processing, comprising: a distribution plate; a first plate having exclusively first bores through which a first gas passes, wherein a first section is formed between the distribution plate and the first plate, wherein the first gas is

Art Unit: 1763

introduced into the first section and passes through the first bores; and a second plate having second bores through which a second gas passes, wherein a second section is formed between the first plate and the second plate, wherein the second gas is introduced into the second section and passes through the second bores, said second plate further having third bores through which the first gas passes, wherein there is no gas communication between the third bores and the second bores, but there is gas communication between the third bores and the first bores, wherein the second plate is disposed above the support, the first plate is disposed above the second plate, and the distribution plate is disposed above the first plate, the first plate and the second plate are overlapped as viewed in their axial direction where the second plate has both the second bores and the third bores and the first plate has the first bores only, either both and at least one of the first section or the second section is coupled to an exhaust system or the second section is coupled to an exhaust system exclusively which discharges the gas in the corresponding section without passing through the corresponding bores.

Claim 31 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the first plate and the second plate are disposed parallel to each other, and the distribution plate has a cone shape.

Claim 32 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the distribution plate is provided with a first gas inlet disposed in a central area of the distribution plate for introducing the first gas into the first section.

Claim 33 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the second section is provided with a second gas inlet disposed in the vicinity of an outer periphery of the second section.

Claim 34 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the first section is coupled to the exhaust system, wherein the first gas present in the first section is exhausted around an outer periphery of the distribution plate.

Claim 35 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the second section is coupled to the exhaust system, wherein the second gas present in the second section is exhausted through a second gas outlet disposed in the vicinity of an outer periphery of the second section.

Claim 36 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the second bores are disposed predominantly in a central area of the second plate.

Claim 37 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the first bores are distributed uniformly on the first plate, and the third bores are disposed right under the respective first bores.

Claim 38 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the third bores have a total opening area which is larger than that of the second bores.

Art Unit: 1763

Claim 39 (Previously Presented): The gas-feeding apparatus according to Claim 30, wherein the third bores have an average bore size which is larger than that of the second bores.

Claim 40 (Previously Presented): The gas-feeding apparatus according to Claim 36, wherein the second section is coupled to the exhaust system and is provided with a second gas inlet and a second gas outlet near an outer periphery of the second section, wherein the second section has a prolonged shape from the inlet to the outlet via the central area having the second bores.

Allowable Subject Matter

3. Claims 1-20 and 30-40 are allowed.

4. The following is a statement of reasons for the indication of allowable subject matter: As noted in Applicant's May 21, 2007 response on page 2, Applicant's statements remove US 2005/0208217 as a 102(e) reference in the Examiner's proposed 103(a) rejection under 103(c). As noted in the Examiner's claim analysis of March 23, 2007, US 2005/0208217 was cited as being the closest prior art to the pending claims examined. Further, the Examiner's double patenting rejection is also withdrawn as a consequence of Applicant's approved terminal disclaimer.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner

Art Unit: 1763

can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

Parviz Hassanzadeh
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